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AMCOM Industrial Operations Division (IOD) required engineering support in performing microelectronic technology and availability assessments for several hundred items and in assessing the impact of nonavailability on the MLRS weapon system. IOD also required engineering support in performing producibility analyses of the MLRS weapon system. In order to facilitate the assessment of this system, the Systems Management and Production Laboratory at The University of Alabama in Huntsville Research Institute was tasked to conduct an in-depth analysis as to the life cycle health of the MLRS weapon system's component parts.

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Technical Report 5-34824
Contract No. DAAH01-92-D-R006
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Microelectronic Status Analysis and Secondary Part Procureability Assessment of the Multiple Launch Rocket System (MLRS)

(5-34824)

Final Technical Report for Period
14 July 1997 through 30 June 1998

July 1999

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Prepared for:

U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898
Attn.: Mr. Doug Johnston

PREFACE

This technical report was prepared by the staff of the Research Institute, The University of Alabama in Huntsville. The purpose of this report is to provide documentation of the work performed and results obtained under Delivery Order 133 of AMCOM Contract No. DAAH01-92-D-R006. Mr. Robert Harvey and Mr. Gary Maddux were the principal investigators. Mr. Doug Johnston, Industrial Operations Division, Systems Engineering and Production Directorate, Research, Development, and Engineering Center, U.S. Army Aviation & Missile Command, provided technical coordination.

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation.

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Prepared for: Commander
U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898

I have reviewed this report, dated July 99 and the report contains no classified information.

Gary A Maddux
Principal Investigator

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1.0 Introduction

The Industrial Operations Division (IOD), SEPD, RDEC, AMCOM has the mission and function of providing microelectronic technology assessments, and producibility and supportability analyses for the MLRS system. IOD evaluates the impacts of nonavailability of microelectronic parts on the life cycle supportability of the MLRS system and evaluates the producibility of the MLRS system. IOD required engineering support in performing microelectronic technology and availability assessments for several hundred items and in assessing the impact of nonavailability on the MLRS system. IOD also required engineering support in performing producibility analyses of the MLRS system.

In order to facilitate the assessment of this system, the Systems Management and Production Laboratory at The University of Alabama in Huntsville Research Institute was tasked to conduct an in-depth analysis as to the life cycle health of the MLRS weapon system's component parts.

2.0 Objective

The purpose of the work to be performed under this task order was to provide engineering support to analyze the availability of microelectronics used in the MLRS system and to investigate and develop solutions for problem parts. Determination of the producibility of the MLRS system and/or subsystem was required.

3.0 Statement of Work

The statement of work, as outlined in delivery order 133, was as follows:

3.1 UAH shall analyze the availability of microelectronic parts used in the MLRS weapon system. The analyses shall be for microelectronics specifically identified by the IOD. UAH shall assess the impact of the nonavailability of the microelectronics on system supportability. UAH shall evaluate the problem resolution approaches. UAH shall identify opportunities for insertion of new electronic technologies to resolve microelectronic availability and obsolescence problems. The analyses will be performed using government furnished databases and automated tools such as the Enhanced Microcircuit Obsolescence Analysis Tool (E-MOAT) local area network and with the TACTech information service. Other available sources of information will be used as required. Analyses results shall be recorded in databases which will be compatible with current government databases and delivered in digital and written report format to the government. Results also shall be presented and documented in a final report. All results shall be delivered to the government.

3.1.1 UAH shall define microelectronic component obsolescence assessment methods. UAH shall analyze current government obsolescence assessment methods. Additional approaches shall be developed as required. Analysis methods, data sources, criteria and reporting formats shall be documented within all written reports.

3.1.2 UAH shall research and analyze MLRS microelectronic component availability data. Commercial and government databases shall be searched for data on microelectronic obsolescence and availability. Alternate sources, part numbers and qualified substitutes for obsolete or unavailable parts shall be identified. Compliance with military and commercial standards shall be verified. Specific alternate and substitute parts for those determined obsolete or determined to pose obsolescence potential shall be recommended.

3.1.3 UAH shall assess MLRS system readiness, producibility, and supportability impacts resulting from microelectronic obsolescence. Specific component availability and obsolescence problems affecting the MLRS system shall be identified. Quantitative statistics to demonstrate the impacts at the system, line replaceable unit (LRU), circuit board and component levels shall be derived. Potential approaches to resolve availability and obsolescence problems and reduction of their impacts on system supportability shall be proposed.

3.1.4 UAH shall identify opportunities for insertion of new microelectronic technologies into the MLRS system. LRUs or boards which are candidates for redesign based on their use of obsolete microelectronics shall be identified.

3.1.5 UAH shall investigate the use of the technology insertion program to resolve deficient technical data packages (TDP), eliminate sole source TDPs, and delete Reliability, Availability, and Maintainability (RAM) problems. Benefits in terms of improved performance, producibility, readiness and life cycle costs shall be demonstrated.

3.2 UAH shall analyze the producibility of the MLRS system and subsystems. The analyses will be performed on parts specifically identified by the government. UAH shall analyze TDP data (listings, engineering documentation and changes therto) to advise the government if the present baseline and/or detail drawings are adequate for competitive procurement and/or manufacture. UAH shall, during TDP analysis, document any cost reduction opportunities in the TDP, using value engineering methodology as a generally accepted practice of cost analysis. UAH shall provide a written report for each TDP analyzed. The report will detail any deficiencies and provide recommended solutions. UAH shall provide recommended TDP updates where applicable.

3.3 UAH shall perform an engineering analysis on producibility problems identified during the procurement cycle of MLRS secondary items. The analysis

will require review of drawings, specifications, and related materials. UAH shall determine and recommend solutions to the producibility problems and provide rationale to support recommendations. UAH shall, during engineering analysis, document any cost reduction opportunities in the TDP, using value engineering methodology as a generally accepted practice of cost analysis. Results of the analysis shall be prepared and furnished in a written report.

3.4 UAH shall provide engineering support for the development of Very High Speed Integrated Circuit (VHSIC) Hardware Description Language (VHDL) modeling for selected MLRS microcircuits as well as support other performance related acquisition efforts.

4.0 Assessment of the MLRS System

Under this task members of the UAH Systems Management and Production Lab performed a detailed engineering analysis on the component parts of the MLRS weapon system. Specifically, microelectronic components were analyzed according to their availability and expected life cycle. To ascertain this information, UAH worked with the electronics industry, the MLRS Project Office, and other government agencies.

The results of this task were published in the *Microcircuit Obsolescence Assessment of the MLRS* and delivered to IOD under separate cover.

5.0 Conclusion and Recommendations

During the time frame allocated by the delivery order, members of the UAH Systems Management and Production Lab, with the cooperation of representatives from AMCOM Systems Engineering and Production Directorate and the MLRS Project Office investigated the life cycle supportability of the microelectronics of the MLRS weapon system. Because of the rapidly changing microelectronics industry, it is imperative that this assessment be refreshed on a periodic basis. Only through the diligent monitoring of a complex system can its sustainability issues be properly addressed. It is recommended that the MLRS weapon system adopt a proactive obsolescence management philosophy so that the total cost of ownership is reduced over the system's life cycle.